New England Common Assessment Program

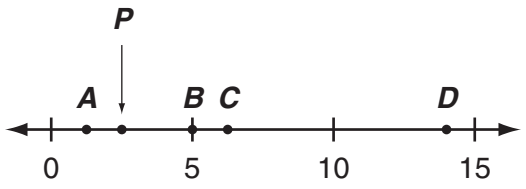
Released Items 2007

Grade 11 Mathematics

Mathematics

Item selected from Session One—no calculators or other mathematics tools allowed.

1 Look at this number line.



If point P represents $\sqrt{x}$, which point is closest to the value of x?

A. point A
B. point B
C. point C
D. point D

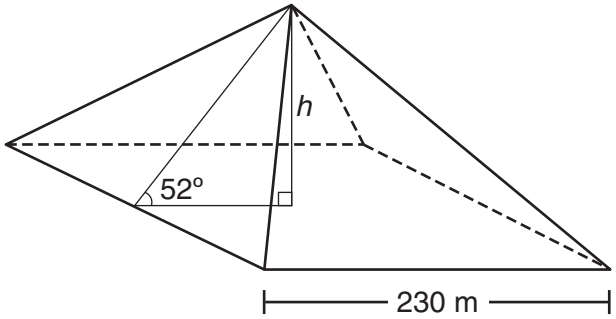
2 Renata is a sales representative for a printer company. She sells two models of printers—Model P and Model Q.

- Last month she sold a total of 120 printers.
- The ratio of Model P printers sold to Model Q printers sold was 3:5.

If Renata is paid a $25 commission for every Model P printer sold and a $20 commission for every Model Q printer sold, what was her total commission last month?

A. $1480
B. $2475
C. $2625
D. $2760

3 This diagram shows the angle of inclination of the triangular faces of the Great Pyramid in Egypt.



When it was built, the length of each side of the square base was 230 meters. Which equation represents the height, h, of the Great Pyramid when it was built?

A. $h = 115 \sin 52°$

B. $h = 115 \tan 52°$

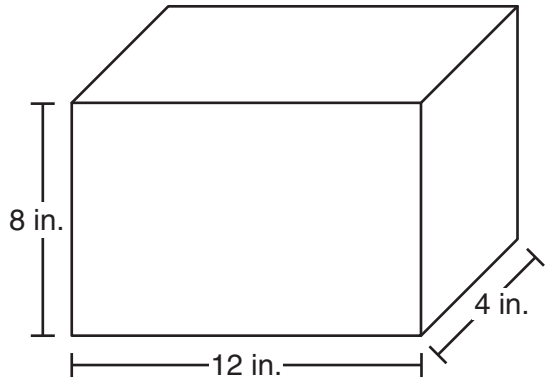
C. $h = \frac{115}{\sin 52°}$

D. $h = \frac{115}{\tan 52°}$

4 What are the coordinates of the image of point $P(-3, -7)$ after a reflection about the line $y = 2$?

A. $(-3, 9)$
B. $(-3, 11)$
C. $(5, -7)$
D. $(7, -7)$

5 Look at this rectangular prism.



What could be the dimensions of a rectangular prism that is similar to this rectangular prism?

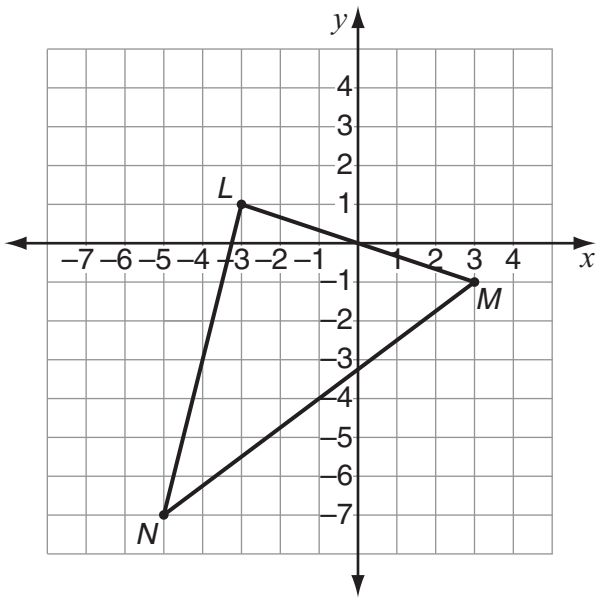
A. 6 in., 2 in., 1 in.

B. 9 in., 6 in., 3 in.

C. 15 in., 11 in., 7 in.

D. 24 in., 8 in., 4 in.

6 Look at ΔLMN on this grid.



What is the length, in units, of $\overline{MN}$?

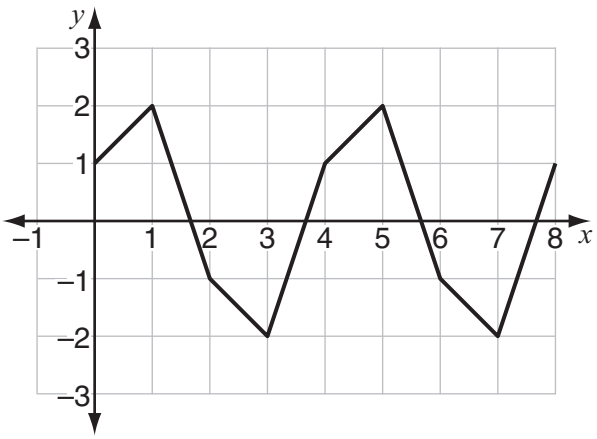
A. 6

B. 8

C. 9

D. 10

7 Look at this function.



As the value of x increases, the y-values form a repeating pattern. If this pattern continues, what is the y-value when $x = 26$?

A. –2
B. –1
C. 1
D. 2

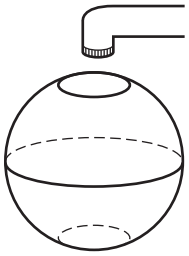
8 A guitar manufacturer uses a computer-controlled machine to make electric guitars. The table below shows the total number of guitars made after 2, 4, 8, and 16 hours.

Hours (h)	Total Number of Guitars Made (g)
2	18
4	42
8	90
16	186

If g represents the total number of guitars made after h hours, which equation represents the pattern shown in the table?

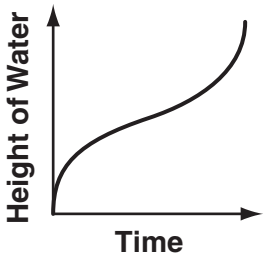
A. $g = 12h - 6$
B. $g = 12h$
C. $g = 3h^2 - 6$
D. $g = 3h^2 + 6$

9 Look at this container.

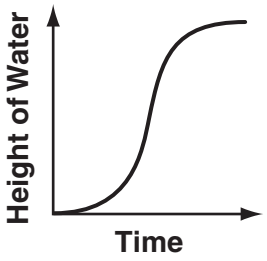


Water flows into this container at a constant rate. Which graph could represent the height of the water in the container over time?

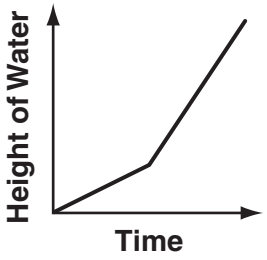
A.



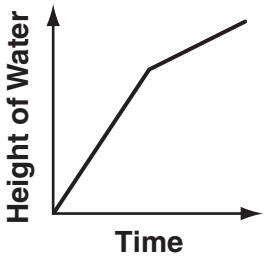
B.



C.



D.



10 What is the range of the function $f(x) = x^2 + 3$ if the domain is $\{-3, 0, 3\}$?

A. $\{3, 12\}$

B. $\{-6, 3, 12\}$

C. all real numbers

D. all real numbers greater than or equal to 3

11 The typical wingspan of the little blue heron is 4 inches more than half the typical wingspan of the great blue heron. If g represents the typical wingspan of the great blue heron, which expression represents the typical wingspan of the little blue heron?

A. $4\left(\frac{1}{2}g\right)$

B. $\frac{1}{2}g + 4$

C. $2g + 4$

D. $\frac{1}{2}(g + 4)$

12 The sum of three consecutive odd integers is 21. If x is the least of these odd integers, which equation **must** be true?

A. $3x = 21$

B. $3x + 3 = 21$

C. $3x + 4 = 21$

D. $3x + 6 = 21$

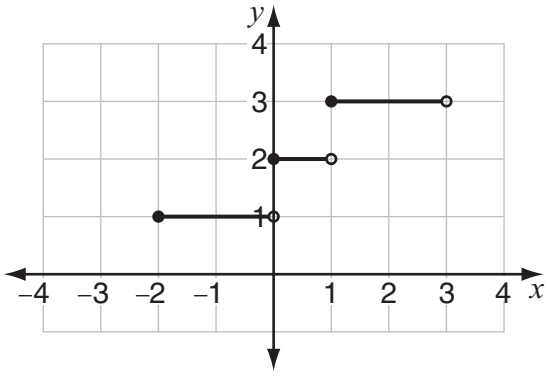
13 Look at this inequality.

$$|x + 5| \leq 2$$

List all **integer** values of x that make the inequality true.

14 A square with a side length of 8.0 cm is rolled up, without overlap, to form the lateral surface of a cylinder. What is the radius of the cylinder to the nearest tenth of a centimeter?

15 Look at this graph of a function.



What is the range of this function?

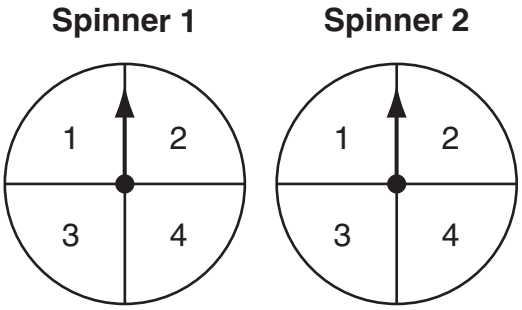
16 Zack has $60 to spend on a fish tank, supplies, and some fish.

- The fish tank and supplies cost $29.50.
- Each fish costs $2.70.

What is the maximum number of fish that Zack can buy?

17 Al, Chris, Janet, and Tara will each give a speech to their class. In how many different orders can they give their speeches if Al must speak immediately after Tara?

18 Look at these spinners.



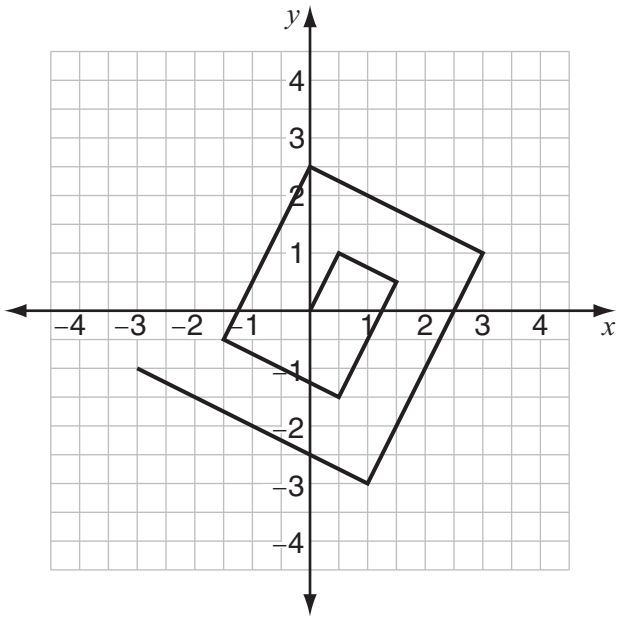
Gary will spin the arrow on each spinner once and record the sum of the two numbers the arrows land on. What is the probability that the sum of the two numbers will be a prime number?

19 The Doucettes produce and sell maple syrup.

- Each year they sell all the maple syrup they produce.
- Last year they sold 640 gallons of maple syrup.
- This year they will sell maple syrup at a price that is 20% lower than it was last year.

How many gallons of maple syrup must the Doucettes sell this year so their income from maple syrup sales stays the same as it was last year? Show your work or explain how you know.

20 Starting at the origin, Nadia drew eight line segments on this coordinate grid.

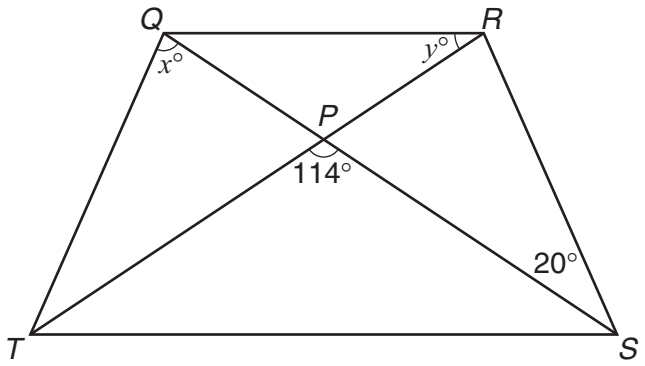


Nadia continues her pattern. What is the slope of the 25th line segment she will draw? Show your work or explain how you know.

21 The manager of a music store ordered 20 new violins. She ordered some of two different models—the standard and the deluxe. Each standard violin costs $500, and each deluxe violin costs $800.

If the manager spent exactly $11,500 on these violins, how many deluxe violins did she order? Show your work or explain how you know.

22 Look at this diagram.



not drawn to scale

- Quadrilateral $QRST$ has diagonals $\overline{QS}$ and $\overline{RT}$ that intersect at point P.
- Triangle QPT is congruent to triangle RPS ($\Delta QPT \cong \Delta RPS$).

a. What is the value of x? Show your work or explain how you know.

b. What is the value of y? Show your work or explain how you know.

23 A car dealer has 75 new vehicles. This table shows how the new vehicles are distributed by type and color.

	Cars	Trucks	Vans
Tan	5	2	3
Black	5	7	6
Red	4	2	2
Blue	6	6	8
Other	7	9	3

The sales manager plans to select one vehicle at random for a special promotion.

a. What is the probability that the vehicle selected will be a car?

b. If the vehicle selected is a van, then what is the probability that the van is black?

c. What is the probability that the vehicle selected will be either black or a van? Show your work or explain how you know.

Grade 11 Mathematics Released Item Information

Released Item Number	1	2	3	4	5	6	7	8	9	10	11	12
No Tools Allowed	✓	✓		✓				✓	✓	✓		
Content Strand[1]	NO	NO	GM	GM	GM	GM	FA	FA	FA	FA	FA	FA
GSE Code	10-2	10-4	10-2	10-4	10-5	10-9	10-1	10-2	10-2	10-2	10-3	10-4
Depth of Knowledge Code	2	2	1	2	2	1	2	1	2	1	1	2
Item Type[2]	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC
Answer Key	C	C	B	B	B	D	B	A	A	A	B	D
Total Possible Points	1	1	1	1	1	1	1	1	1	1	1	1

Released Item Number	13	14	15	16	17	18	19	20	21	22	23
No Tools Allowed	✓					✓	✓			✓	
Content Strand[1]	NO	GM	FA	FA	DP	DP	NO	FA	FA	GM	DP
GSE Code	10-2	10-6	10-2	10-4	10-4	10-5	10-4	10-1	10-4	10-2	10-5
Depth of Knowledge Code	2	2	1	2	2	2	2	2	2	2	2
Item Type[2]	SA	SA	SA	SA	SA	SA	SA	SA	SA	CR	CR
Answer Key											
Total Possible Points	1	1	1	1	1	1	2	2	2	4	4

[1]Content Strand: NO = Numbers & Operations, GM = Geometry & Measurement, FA = Functions & Algebra, DP = Data, Statistics, & Probability

[2]Item Type: MC = Multiple Choice, SA = Short Answer, CR = Constructed Response

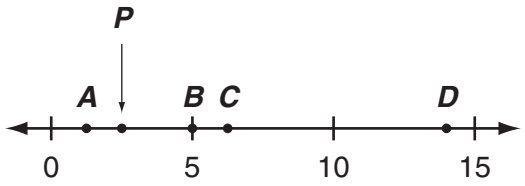
New England Common Assessment Program

Released Items Support Materials 2007

Grade 11 Mathematics

N&O 10.2 **Demonstrates understanding of the relative magnitude of real numbers** by solving problems involving ordering or comparing rational numbers, common irrational numbers (e.g., $\sqrt{2}$, π), rational bases with integer exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.

1 Look at this number line.



If point P represents $\sqrt{x}$, which point is closest to the value of x?

A. point A
B. point B
C. point C
D. point D

N&O 10.4 **Accurately solves problems involving** rational numbers within mathematics, across content strands, disciplines or contexts (with emphasis on, but not limited to, proportions, percents, ratios, and rates).

2 Renata is a sales representative for a printer company. She sells two models of printers—Model P and Model Q.

- Last month she sold a total of 120 printers.
- The ratio of Model P printers sold to Model Q printers sold was 3:5.

If Renata is paid a $25 commission for every Model P printer sold and a $20 commission for every Model Q printer sold, what was her total commission last month?

A. $1480

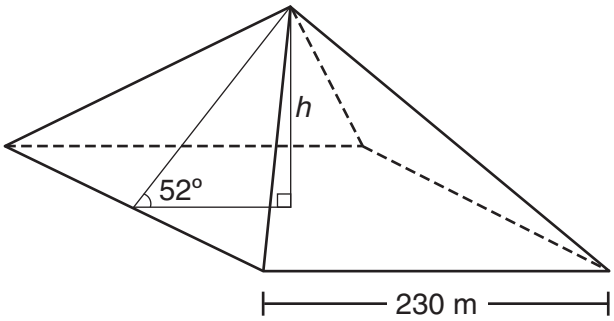
B. $2475

C. $2625

D. $2760

G&M 10.2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).

3 This diagram shows the angle of inclination of the triangular faces of the Great Pyramid in Egypt.



When it was built, the length of each side of the square base was 230 meters. Which equation represents the height, h, of the Great Pyramid when it was built?

A. $h = 115 \sin 52°$

B. $h = 115 \tan 52°$

C. $h = \frac{115}{\sin 52°}$

D. $h = \frac{115}{\tan 52°}$

G&M 10.4 Applies the concepts of congruency by solving problems on or off a coordinate plane involving reflections, translations, or rotations; or solves problems using congruency involving problems within mathematics or across disciplines or contexts.

4 What are the coordinates of the image of point $P(-3, -7)$ after a reflection about the line $y = 2$?

A. (–3, 9)

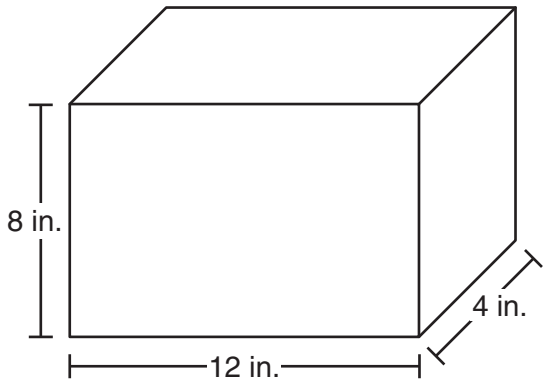
B. (–3, 11)

C. (5, –7)

D. (7, –7)

G&M 10.5 Applies concepts of similarity by solving problems within mathematics or across disciplines or contexts.

5 Look at this rectangular prism.



What could be the dimensions of a rectangular prism that is similar to this rectangular prism?

A. 6 in., 2 in., 1 in.

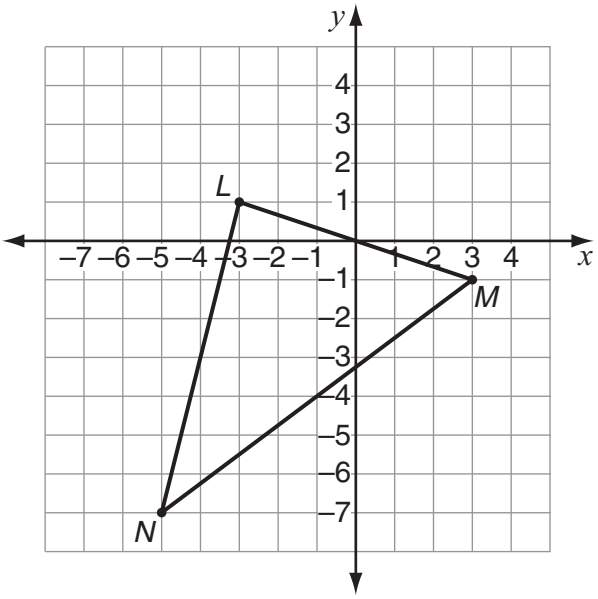
B. 9 in., 6 in., 3 in.

C. 15 in., 11 in., 7 in.

D. 24 in., 8 in., 4 in.

G&M 10.9 Solves problems on and off the coordinate plane involving distance, midpoint, perpendicular and parallel lines, or slope.

6 Look at ΔLMN on this grid.



What is the length, in units, of $\overline{MN}$?

A. 6

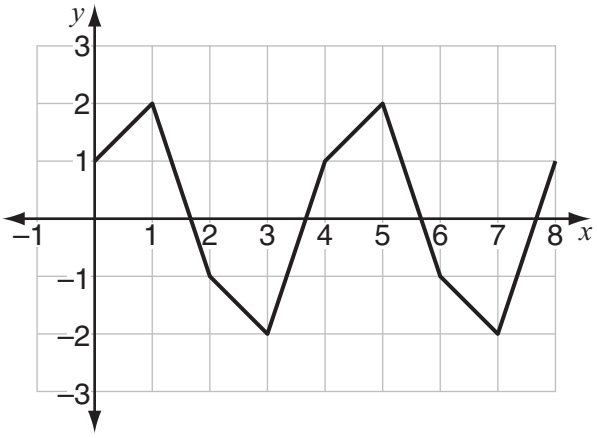
B. 8

C. 9

D. 10

F&A 10.1 **Identifies, extends, and generalizes a variety of patterns** (linear and nonlinear) represented by models, tables, sequences, or graphs in problem-solving situations.

7 Look at this function.



As the value of x increases, the y-values form a repeating pattern. If this pattern continues, what is the y-value when $x = 26$?

A. –2

B. –1

C. 1

D. 2

F&A 10.2 **Demonstrates conceptual understanding of linear and nonlinear functions and relations** (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).

8 A guitar manufacturer uses a computer-controlled machine to make electric guitars. The table below shows the total number of guitars made after 2, 4, 8, and 16 hours.

Hours (h)	Total Number of Guitars Made (g)
2	18
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If g represents the total number of guitars made after h hours, which equation represents the pattern shown in the table?

A. $g = 12h - 6$

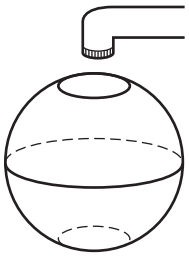
B. $g = 12h$

C. $g = 3h^2 - 6$

D. $g = 3h^2 + 6$

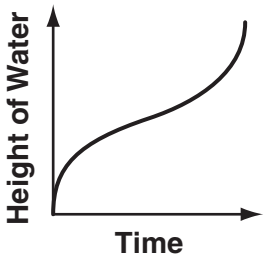
F&A 10.2 **Demonstrates conceptual understanding of linear and nonlinear functions and relations** (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).

9 Look at this container.

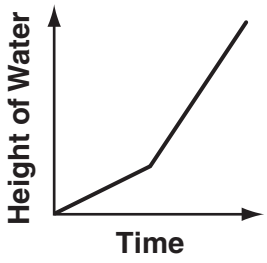


Water flows into this container at a constant rate. Which graph could represent the height of the water in the container over time?

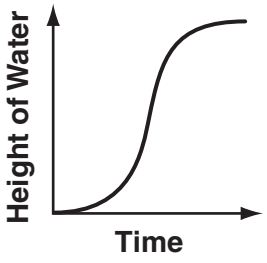
A.



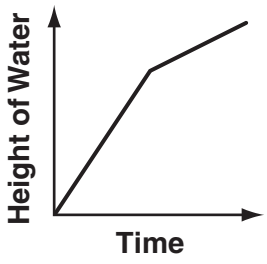
C.



B.



D.



F&A 10.2 **Demonstrates conceptual understanding of linear and nonlinear functions and relations** (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).

10 What is the range of the function $f(x) = x^2 + 3$ if the domain is $\{-3, 0, 3\}$?

A. $\{3, 12\}$

B. $\{-6, 3, 12\}$

C. all real numbers

D. all real numbers greater than or equal to 3

F&A 10.3 **Demonstrates conceptual understanding of algebraic expressions** by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions.

11 The typical wingspan of the little blue heron is 4 inches more than half the typical wingspan of the great blue heron. If g represents the typical wingspan of the great blue heron, which expression represents the typical wingspan of the little blue heron?

A. $4\left(\frac{1}{2}g\right)$

B. $\frac{1}{2}g+4$

C. $2g + 4$

D. $\frac{1}{2}(g+4)$

F&A 10.4 **Demonstrates conceptual understanding of equality** by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.

12 The sum of three consecutive odd integers is 21. If x is the least of these odd integers, which equation **must** be true?

A. $3x = 21$

B. $3x + 3 = 21$

C. $3x + 4 = 21$

D. $3x + 6 = 21$

N&O 10.2 **Demonstrates understanding of the relative magnitude of real numbers** by solving problems involving ordering or comparing rational numbers, common irrational numbers (e.g., $\sqrt{2}$, π), rational bases with integer exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.

13 Look at this inequality.

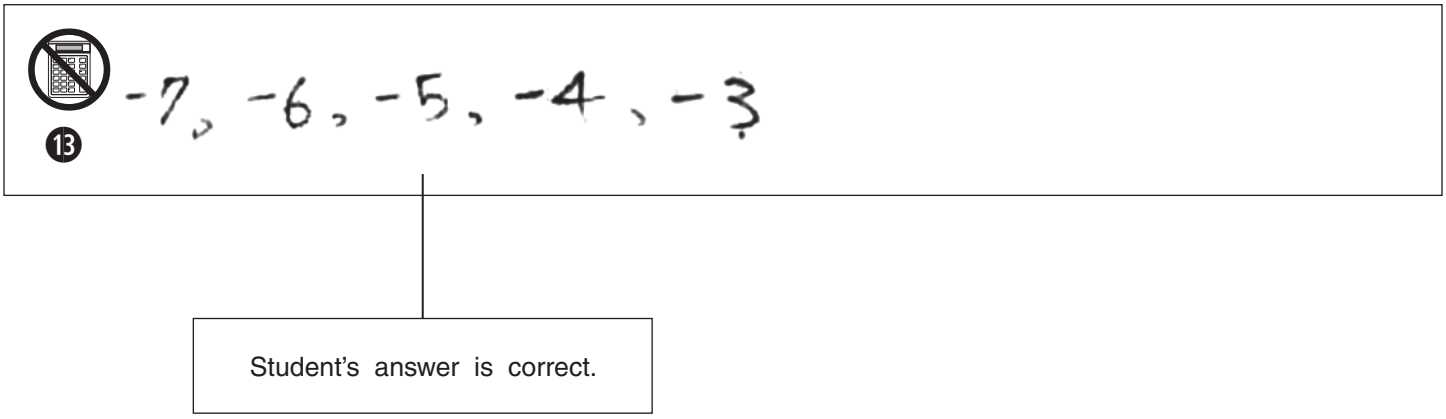
$$|x + 5| \leq 2$$

List all **integer** values of x that make the inequality true.

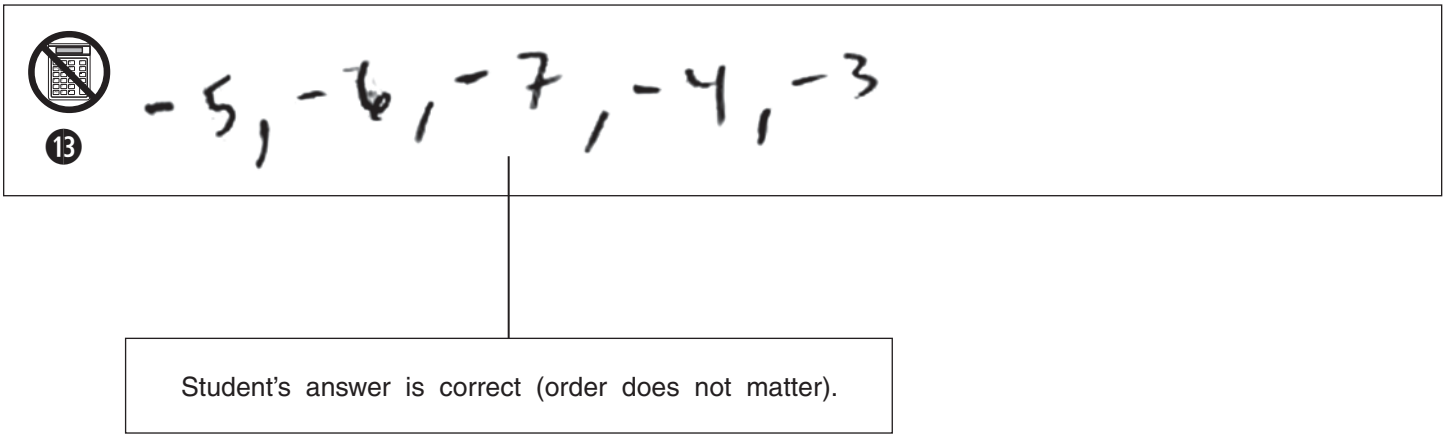
Scoring Guide

Score	Description
1	Student gives the correct answer, **–7, –6, –5, –4, –3.**
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

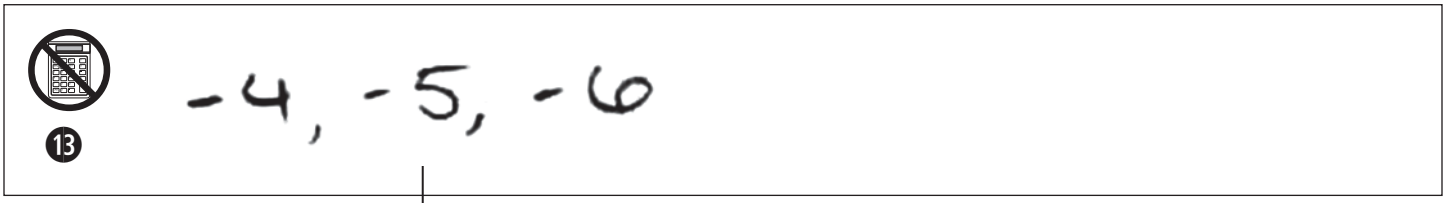
Score Point 1
(Example A)



Score Point 1
(Example B)

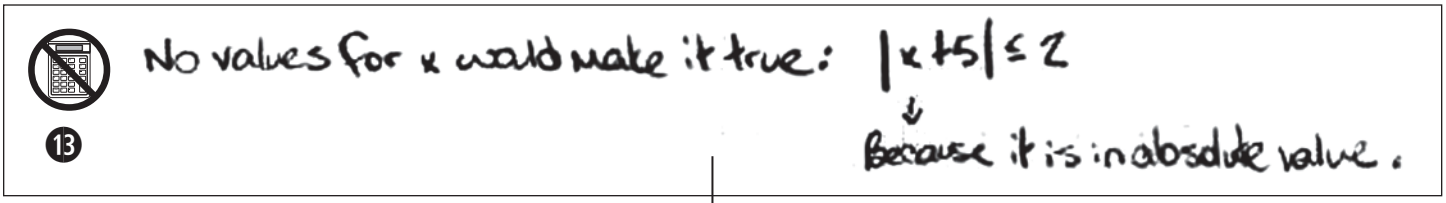


SCORE POINT 0
(EXAMPLE A)



Student's answer is incomplete.

SCORE POINT 0
(EXAMPLE B)



Student's answer is incorrect.

G&M 10.6 **Solves problems involving perimeter, circumference, or area** of two-dimensional figures (including composite figures) or **surface area or volume** of three-dimensional figures (including composite figures) within mathematics or across disciplines or contexts.

14 A square with a side length of 8.0 cm is rolled up, without overlap, to form the lateral surface of a cylinder. What is the radius of the cylinder to the nearest tenth of a centimeter?

Scoring Guide

Score	Description
1	Student gives the correct measure, **1.3** (cm).
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Note: Do not penalize student for giving an exact answer or for going beyond the nearest tenth.

Score Point 1
(Example A)

14

$R = 1.3$

Student's answer is correct.

Score Point 1
(Example B)

14

$2\pi r = 8\text{ cm}$

$r = \frac{8\text{ cm}}{2\pi}$

$r = \frac{4}{\pi}$

Student's answer is correct (showing work is not required).

Score Point 0
(Example A)

14

r - y

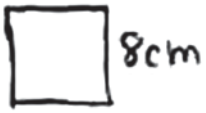
$V = \frac{(\pi r^2)}{8.0}\left(\frac{8.0cm}{8.0}\right)$

$r = V \div \frac{\pi r^2}{8.0}$

Student's answer is incorrect.

Score Point 0
(Example B)

14

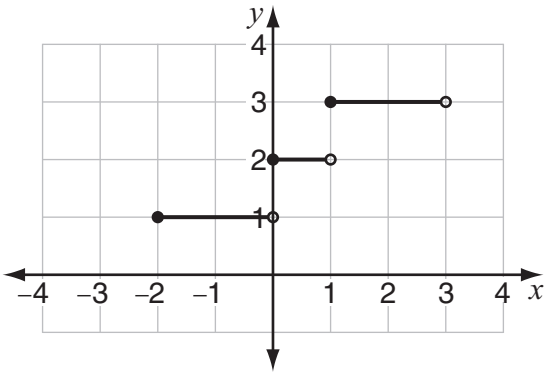


the radius is 4 cm.

Student's answer is incorrect.

F&A 10.2 **Demonstrates conceptual understanding of linear and nonlinear functions and relations** (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).

15 Look at this graph of a function.



What is the range of this function?

Scoring Guide

Score	Description
1	Student gives the correct answer, **{1, 2, 3}**.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Score Point 1
(Example A)

15

1, 2, 3

Student's answer is correct (set notation is not required).

Score Point 1
(Example B)

15

$R = \{y \mid y = 1, 2, 3\}$

Student's answer is correct.

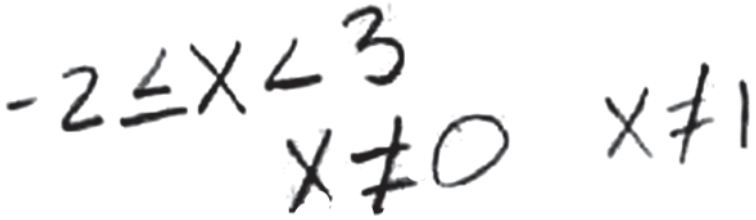
Score Point 0
(Example A)

15

Student's answer is incorrect.

Score Point 0
(Example B)

15



Student's answer is incorrect.

F&A 10.4 **Demonstrates conceptual understanding of equality** by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.

16 Zack has $60 to spend on a fish tank, supplies, and some fish.

- The fish tank and supplies cost $29.50.
- Each fish costs $2.70.

What is the maximum number of fish that Zack can buy?

Scoring Guide

Score	Description
1	Student gives the correct answer, **11** (fish).
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Score Point 1
(Example A)

16

11

Student's answer is correct.

Score Point 1
(Example B)

16

11 fish is the maximum amount he can get

60 - 29.50 = 30.50

$\frac{30.50}{2.70} = 11.3$

Student's answer is correct (showing work is not required).

Score Point 0
(Example A)

16 Zack can buy 22 fishes.
60 ÷ 2.70 = 22.22

Student's answer is incorrect.

Score Point 0
(Example B)

16 60 − 29.50 = 28.90 ÷ 2.70 = (10)

Student's answer is incorrect.

DSP 10.4 **Uses counting techniques to solve problems** in contexts involving combinations or permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or[sc] others).

17 Al, Chris, Janet, and Tara will each give a speech to their class. In how many different orders can they give their speeches if Al must speak immediately after Tara?

Scoring Guide

Score	Description
1	Student gives the correct number of orders in which the students can give their speeches, **6**.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Score Point 1
(Example A)

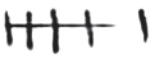
17

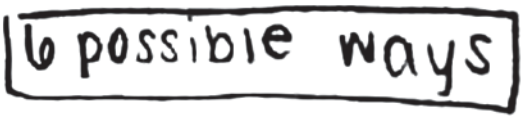
Six

Student's answer is correct.

Score Point 1
(Example B)

17

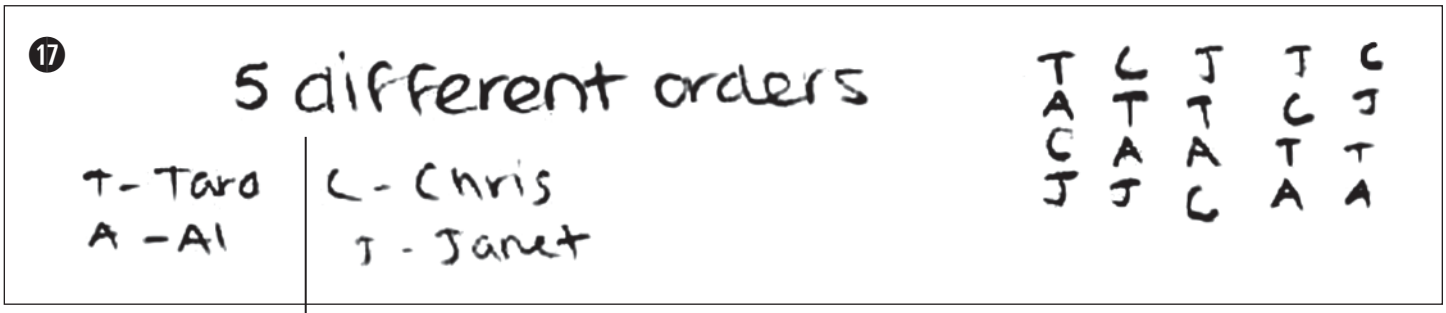




Student's answer is correct (showing work is not required).

SCORE POINT 0
(EXAMPLE A)

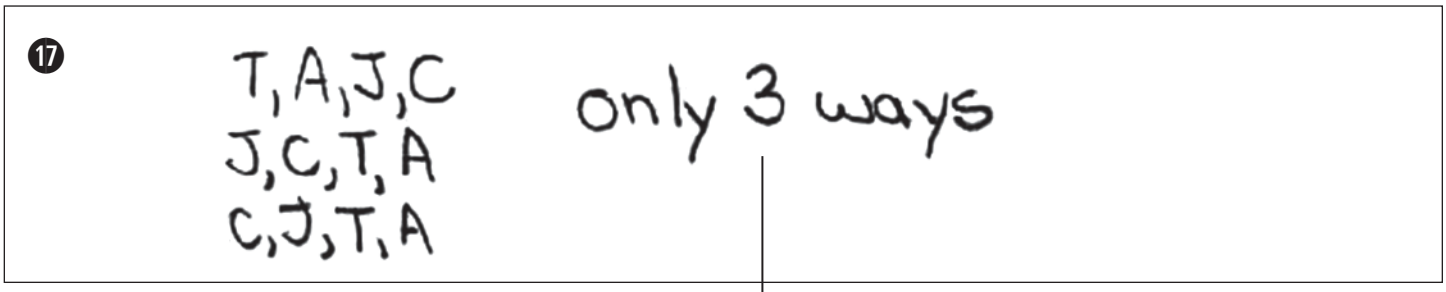
17



Student's answer is incorrect.

SCORE POINT 0
(EXAMPLE B)

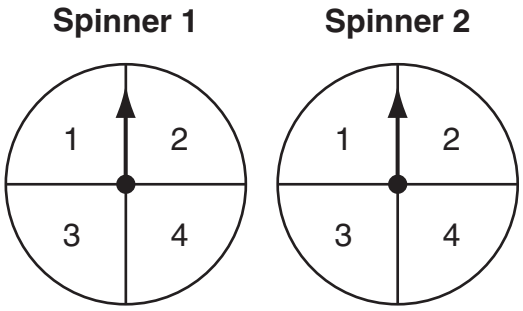
17



Student's answer is incorrect.

DSP 10.5 Solves problems involving experimental or theoretical probability.

18 Look at these spinners.



Gary will spin the arrow on each spinner once and record the sum of the two numbers the arrows land on. What is the probability that the sum of the two numbers will be a prime number?

Scoring Guide

Score	Description
1	Student gives the correct probability, $\frac{9}{16}$ **(or equivalent)**.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

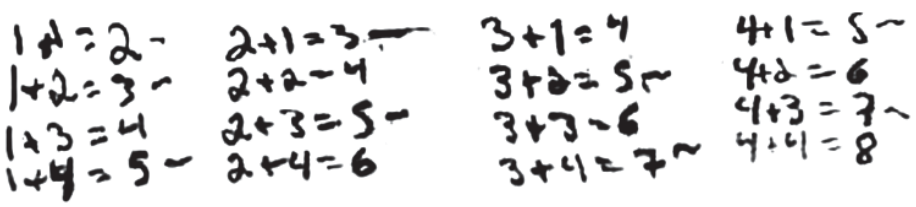
Score Point 1
(Example A)

18

Student's answer is correct.

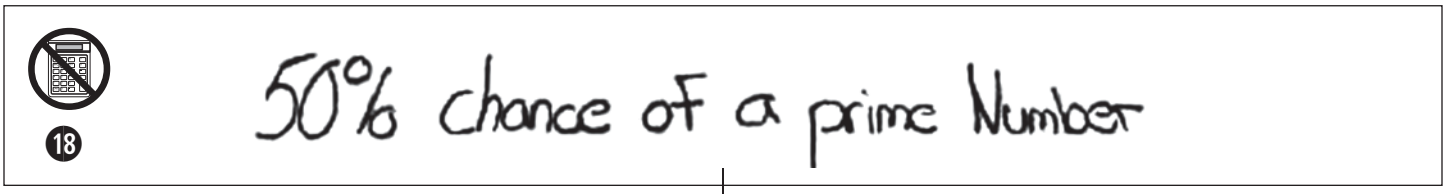
Score Point 1
(Example B)

18



Student's answer is correct (showing work is not required).

SCORE POINT 0
(EXAMPLE A)



Student's answer is incorrect.

N&O 10.4 **Accurately solves problems involving** rational numbers within mathematics, across content strands, disciplines or contexts (with emphasis on, but not limited to, proportions, percents, ratios, and rates).

19 The Doucettes produce and sell maple syrup.

- Each year they sell all the maple syrup they produce.
- Last year they sold 640 gallons of maple syrup.
- This year they will sell maple syrup at a price that is 20% lower than it was last year.

How many gallons of maple syrup must the Doucettes sell this year so their income from maple syrup sales stays the same as it was last year? Show your work or explain how you know.

Scoring Guide

Score	Description
2	Student gives the correct answer, **800** (gallons), and provides appropriate work or explanation.
1	Student gives the correct answer but does not provide appropriate work or explanation. OR Student's work or explanation shows correct strategy, but the answer is not correct.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Sample Responses:
Assume the price of maple syrup last year was $10 per gallon. Then the income last year would have been $640 \times 10 = \$6400$.

This year the price of maple syrup would be $8. Therefore, to make the same income, the family would need to sell $\$6400 \div 8 = 800$ gallons of maple syrup.

OR

Let = the price last year.
If the price is 20% lower this year, then the price this year is 80% of last year's price or 0.8 .

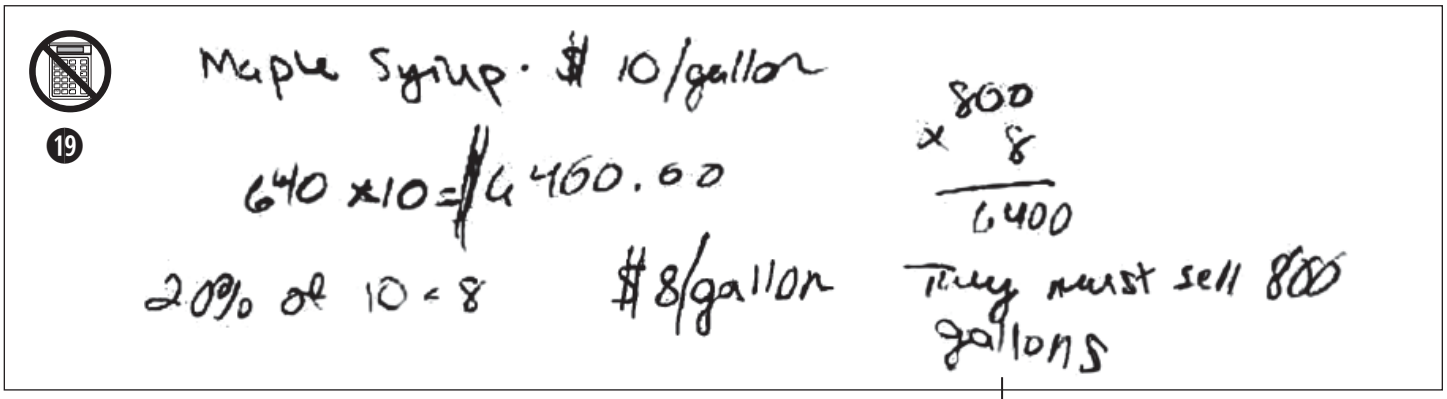
Let = the amount to sell this year.
Last year's income is 640 . This year's income is (0.8).

640 = (0.8)

640 = 0.8

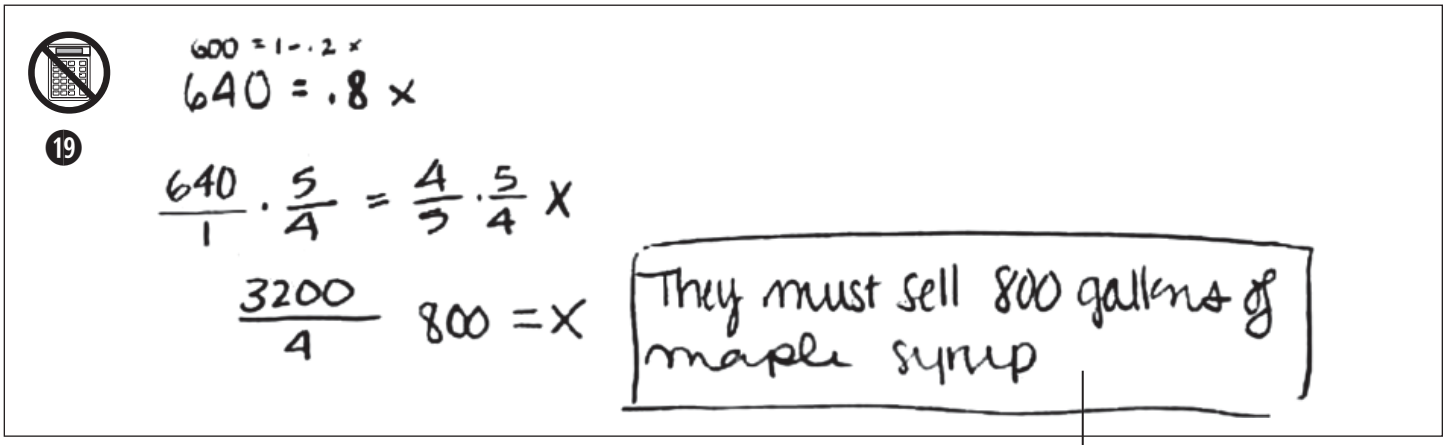
$= \frac{640}{0.8} = 800$

SCORE POINT 2
(EXAMPLE A)



Student's answer is correct, with sufficient work shown. (2 points)

SCORE POINT 2
(EXAMPLE B)



Student's answer is correct, with sufficient work shown. (2 points)

Score Point 1
(Example A)

19

Student's answer is correct, with no explanation given or work shown. (1 point)

Score Point 1
(Example B)

19

640 gallons → last year
20% lower price
IF $1 per gallon $640
80¢ per gallon .80) 640.00 =>

Student's strategy is correct, with an incomplete answer. (1 point)

SCORE POINT 1
(EXAMPLE C)

19

640 gal · 1.00 = 640.00 dollars

653.06
98 | 640.00
586
520
490
300
294
600

653.06 gal

1.00 1.00
.20 -.2
.2 .98

I know this because if they lower it 20% then it will go down approx 2, Thus forcing them to sell 13.06 more gallons.

Student's strategy is correct, with an incorrect answer. (1 point)

SCORE POINT 0
(EXAMPLE A)

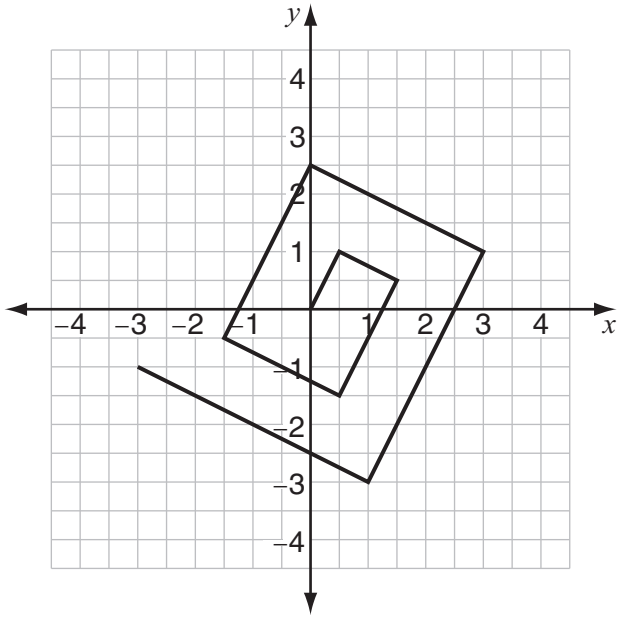
19

The Doucettes must sell 770 gallons.
640 need to sell the same Add
20% so 130 more gallons.

Student's answer is incorrect, with incorrect strategy. (0 points)

F&A 10.1 **Identifies, extends, and generalizes a variety of patterns** (linear and nonlinear) represented by models, tables, sequences, or graphs in problem-solving situations.

20 Starting at the origin, Nadia drew eight line segments on this coordinate grid.



Nadia continues her pattern. What is the slope of the 25th line segment she will draw? Show your work or explain how you know.

Scoring Guide

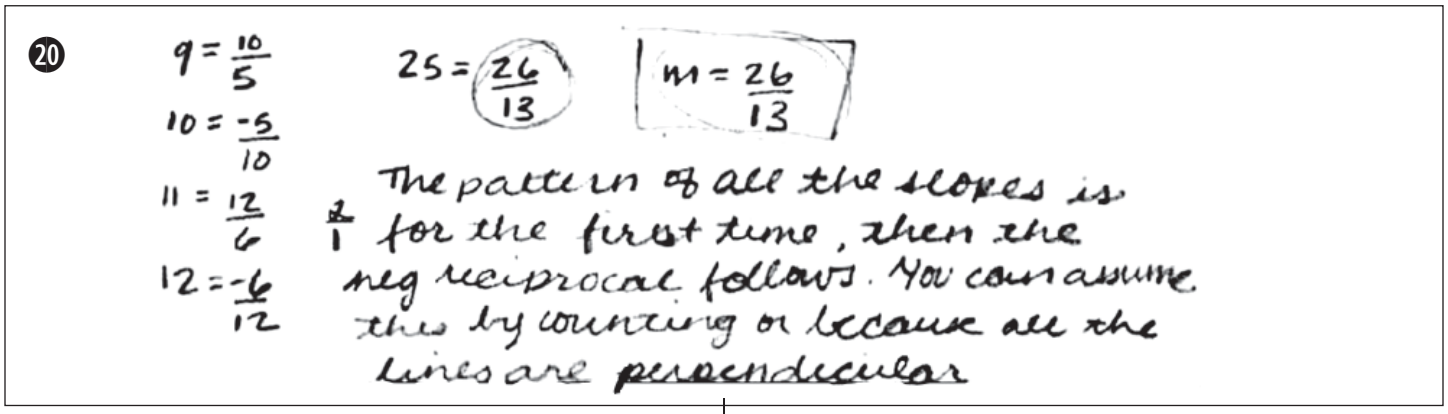
Score	Description
2	Student gives the correct answer, **2 (or equivalent)**, and provides appropriate work or explanation.
1	Student gives the correct answer but does not provide appropriate work or explanation. OR Student's work or explanation shows correct strategy in solving the problem.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Sample Responses:

Segment	1	2	3	4	5	6	7	8
Slope	2	$-\frac{1}{2}$	2	$-\frac{1}{2}$	2	$-\frac{1}{2}$	2	$-\frac{1}{2}$

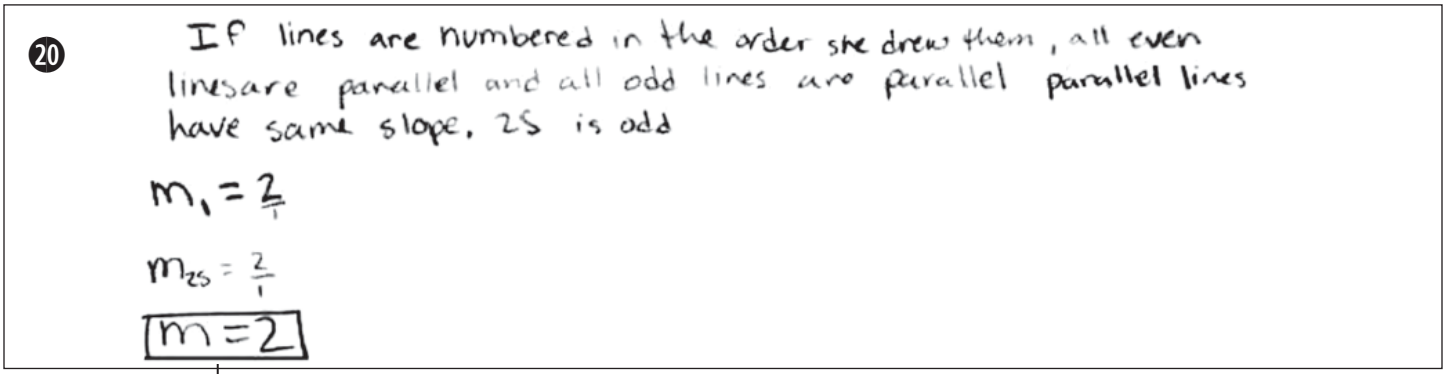
Since 25 is odd, the slope will be 2.

SCORE POINT 2
(EXAMPLE A)



Student's answer is correct, with sufficient explanation given and work shown. (2 points)

SCORE POINT 2
(EXAMPLE B)



Student's answer is correct, with sufficient explanation given. (2 points)

Score Point 1
(Example A)

20

$\frac{2}{1}$

Student's answer is correct, with no explanation given or work shown. (1 point)

Score Point 1
(Example B)

20

$\frac{1}{2x}$ $\frac{4}{-\frac{1}{2}x}$ $\frac{7}{2x}$

$\frac{2}{-\frac{1}{2}x}$ $\frac{5}{2x}$ $\frac{8}{-\frac{1}{2}x}$

$\frac{3}{2x}$ $\frac{6}{-\frac{1}{2}x}$

↳ 25 = odd II = (2x)

Student's answer is incorrect, with sufficient work shown (shows work for the first 8 line segments and extends to the 25th line segment). (1 point)

SCORE POINT 0
(EXAMPLE A)

20

The 25th line will be at 1y, because the line is going up.

Student's answer is incorrect and the explanation is irrelevant to the concept being measured. (0 points)

F&A 10.4 **Demonstrates conceptual understanding of equality** by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.

21 The manager of a music store ordered 20 new violins. She ordered some of two different models—the standard and the deluxe. Each standard violin costs $500, and each deluxe violin costs $800.

If the manager spent exactly $11,500 on these violins, how many deluxe violins did she order? Show your work or explain how you know.

Scoring Guide

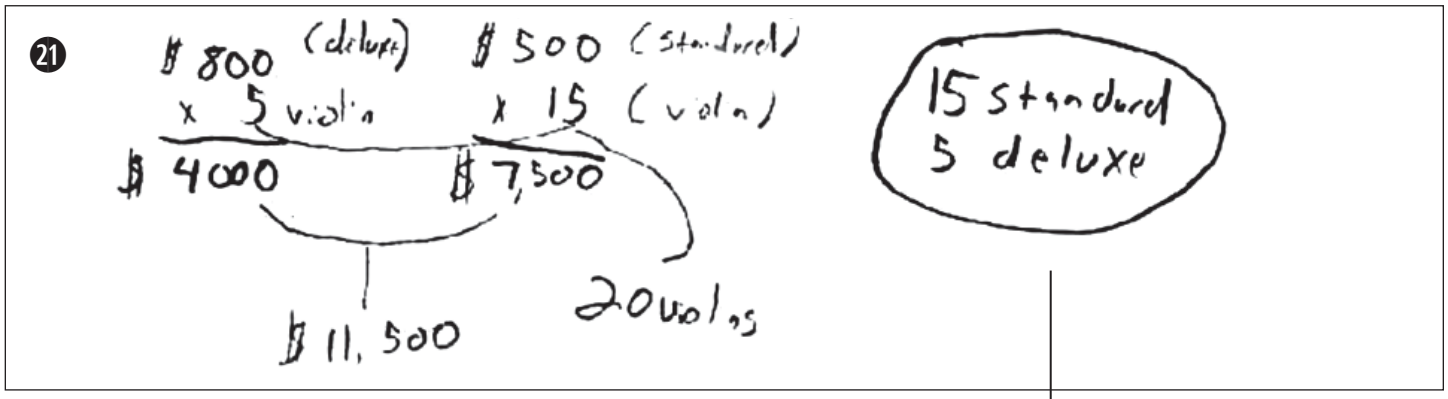
Score	Description
2	Student gives the correct answer, **5**, with sufficient work shown or explanation given to indicate correct strategy.
1	Student gives the correct answer, with insufficient or no work shown or explanation given. OR Student gives a correct strategy, with minor arithmetic or procedural error(s).
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Sample Response:

$s + d = 20$
$500s + 800d = 11{,}500$
$500(20 - d) + 800d = 11{,}500$
$10{,}000 + 300d = 11{,}500$
$300d = 1500$
$d = 5$

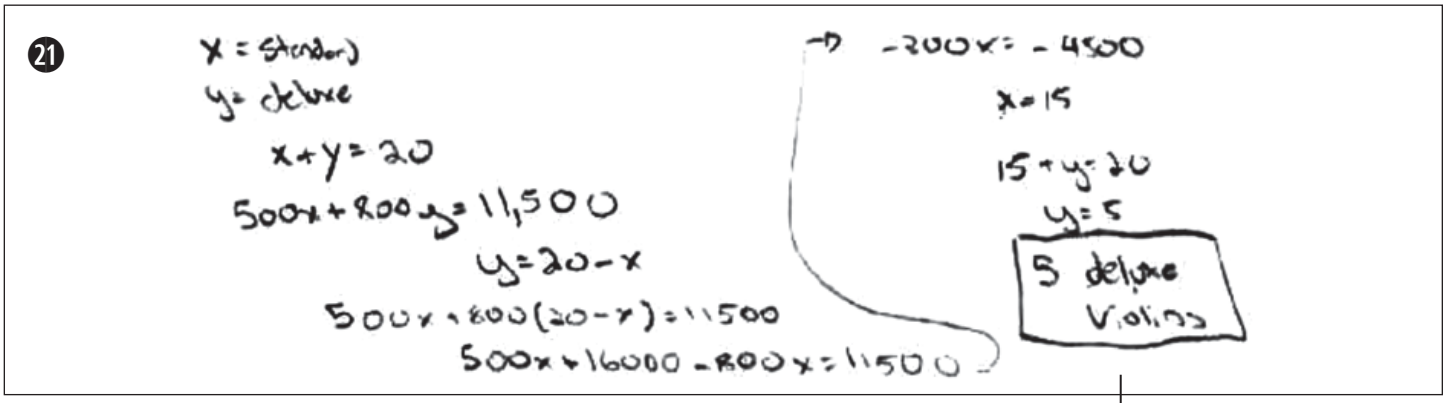
The manager ordered 5 deluxe violins.

SCORE POINT 2
(EXAMPLE A)



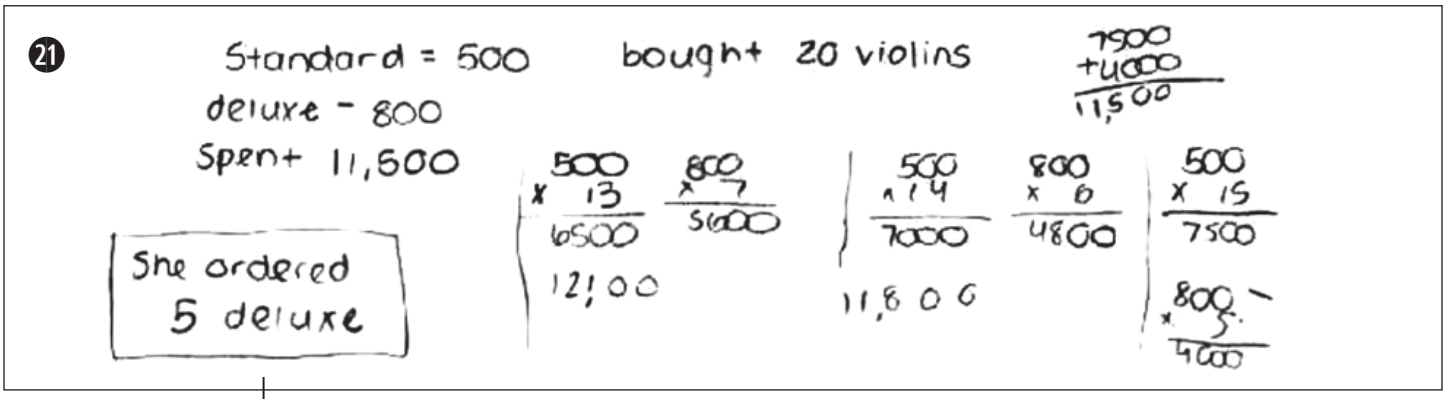
Student's answer is correct, with sufficient work shown. (2 points)

SCORE POINT 2
(EXAMPLE B)



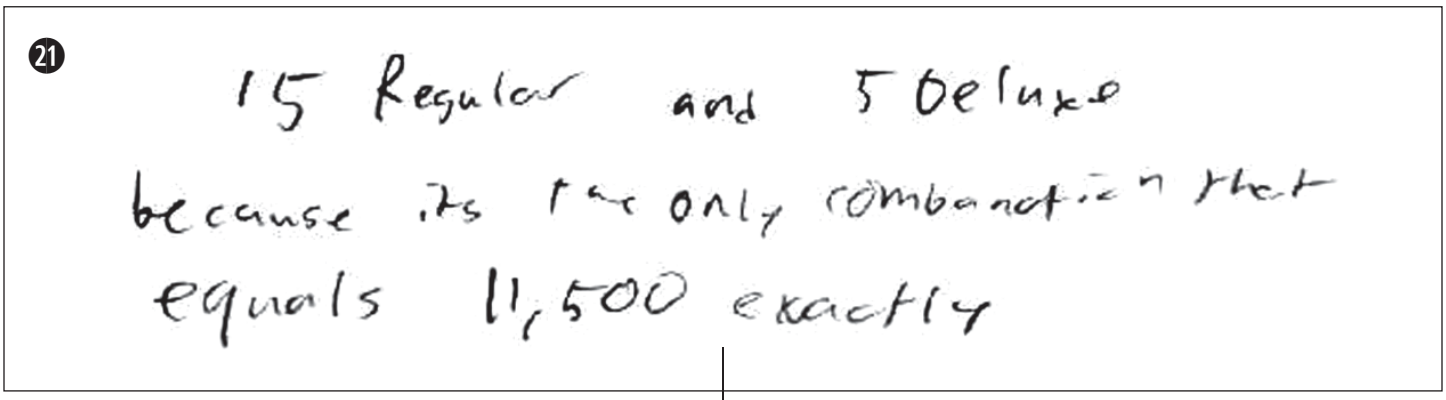
Student's answer is correct, with sufficient work shown. (2 points)

SCORE POINT 2
(EXAMPLE C)



Student's answer is correct, with sufficient work shown. (2 points)

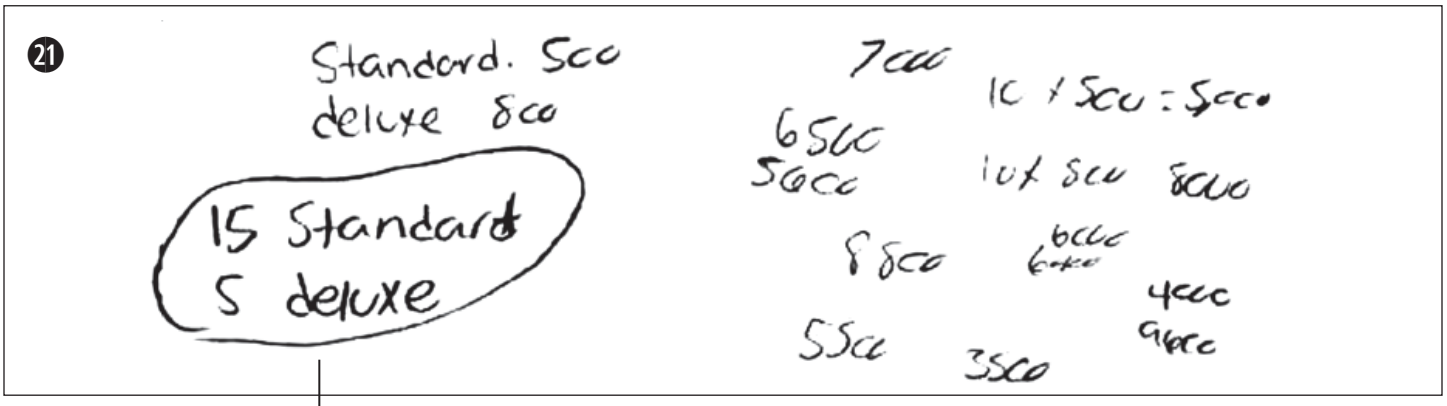
SCORE POINT 1
(EXAMPLE A)



Student's answer is correct, with insufficient explanation given. (1 point)

SCORE POINT 1
(EXAMPLE B)

21



Student's answer is correct, with insufficient work shown. (1 point)

SCORE POINT 0
(EXAMPLE A)

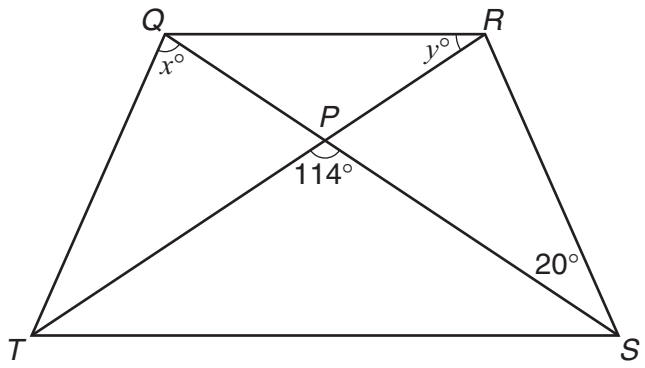
21

10 delux violins, 800×10=8000 & 500×7=3500, so $8000+$3500=$11,500.

Student's answer is incorrect, with an incomplete strategy. (0 points)

G&M 10.2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).

22 Look at this diagram.



not drawn to scale

- Quadrilateral $QRST$ has diagonals $\overline{QS}$ and $\overline{RT}$ that intersect at point P.
- Triangle QPT is congruent to triangle RPS ($\Delta QPT \cong \Delta RPS$).

a. What is the value of x? Show your work or explain how you know.

b. What is the value of y? Show your work or explain how you know.

Scoring Guide

Score	Description
4	4 points
3	3 points
2	2 points
1	1 point
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Part a: 2 points for the correct answer, **94°**, with appropriate strategy shown or explanation given

OR

1 point for the correct answer, with incomplete or no strategy shown

or

for appropriate strategy shown in solving the problem

Part b: 2 points for the correct answer, **33° or a correct answer based on an incorrect answer in part a**, with appropriate strategy shown or explanation given

OR

1 point for the correct answer, with incomplete or no strategy shown

or

for appropriate strategy shown in solving the problem

Sample Responses:

Part a: $180° - 114° = 66° = m\angle QPT$; $m\angle QTP = 20°$ by congruency (corresponding parts of congruent triangles are congruent); $x + 20 + 66 = 180$; $x = 94$

Part b: $m\angle QPR = 114°$ (vertical angles); $\overline{QP} \cong \overline{RP}$ by congruency (corresponding parts of congruent triangles are congruent) $\rightarrow \triangle QPR$ is an isosceles triangle $\rightarrow \angle PQR \cong \angle PRQ$; $y + y + 114 = 180 \rightarrow y = 33$

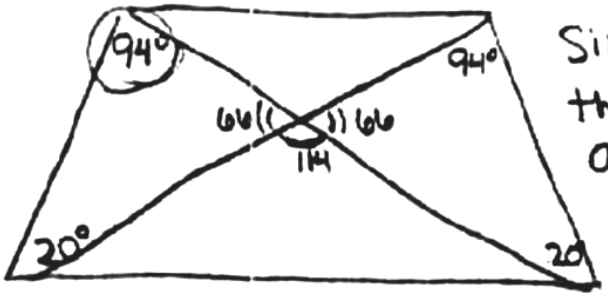
OR

$\frac{66°}{2} = 33°$

SCORE POINT 4
(EXAMPLE A)

Part a

22 $X = 94°$

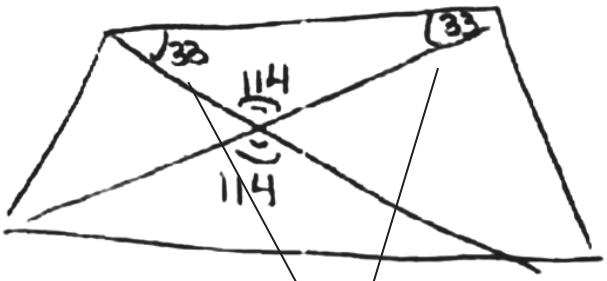


Since $\Delta QPT \cong \Delta RPS$ then all their angles must be the same.
$66° + 114° = 180°$
$66° + 20° + 94° = 180°$
Triangles have 180°.

a) Student's answer is correct, with sufficient explanation given. (2 points)

Part b

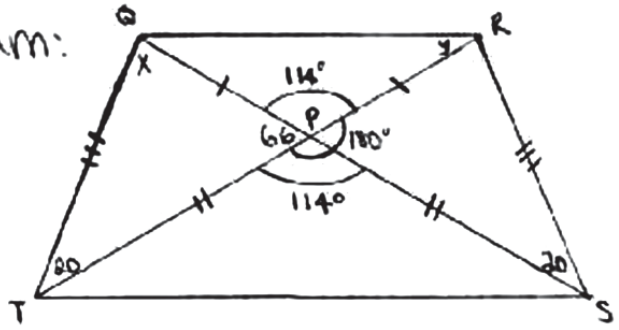
$y = 33°$



b) Student's answer is correct, with sufficient work shown (indicates the measures of the base angles of the isosceles triangle). (2 points)

SCORE POINT 4
(EXAMPLE B)

22 Diagram:



a) Since $\Delta QPT \cong \Delta RPS$, all of the sides and angles are the same. Since $\angle RPT$ is a straight line, the degree measurement is 180°. To find $\angle RPS$, subtract 114 from 180:

$180 - 114 = 66°$

which means $\angle QPR$ is 114 since it is supplementary to $\angle RPS$. Therefore, to find x, subtract 66 + 20 from the total 180°, the total degree measurement in a triangle:

$180 - (66 + 20) = 94°$, so

$\boxed{x = 94°}$

b) Since $\Delta QPT \cong \Delta RPS$, $\overline{QP}$ is equal to the measurement of $\overline{RP}$. Triangle QPR is isosceles and the two base angles are equal. Therefore: $180 - 114 = 2y$, $66 = 2y$

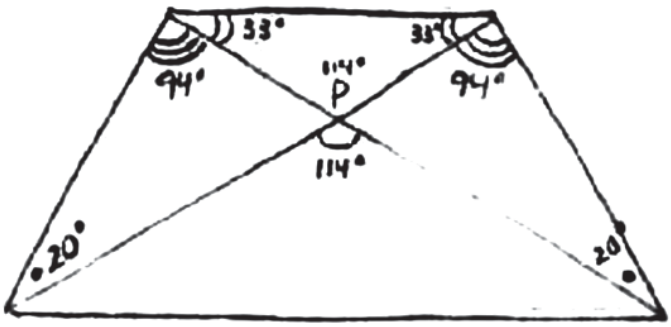
$\boxed{y = 33°}$

a) Student's answer is correct, with sufficient explanation given. (2 points)

b) Student's answer is correct, with sufficient explanation given. (2 points)

SCORE POINT 3
(EXAMPLE A)

22



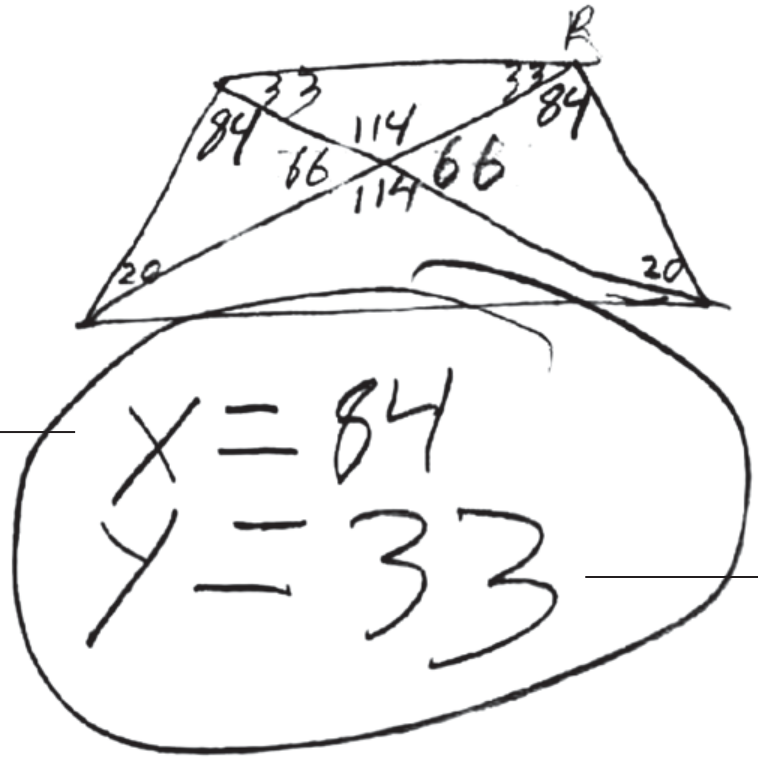
a. $x = 94°$
b. $y = 33°$

a) Student's answer is correct, with insufficient work shown (does not indicate how 94° was determined). (1 point)

b) Student's answer is correct, with sufficient work shown (indicates the measures of the base angles of the isosceles triangle). (2 points)

SCORE POINT 3
(EXAMPLE B)

22

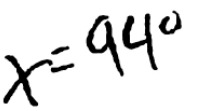


a) Student's answer is incorrect (computational error), with correct strategy shown. (1 point)

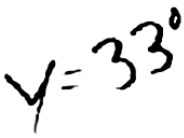
b) Student's answer is correct, with sufficient work shown (indicates the measures of the base angles of the isosceles triangle). (2 points)

SCORE POINT 2
(EXAMPLE A)

22



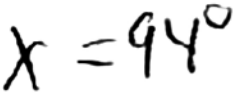
a) Student's answer is correct, with no explanation given or work shown. (1 point)



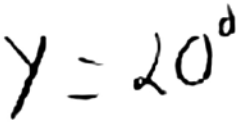
b) Student's answer is correct, with no explanation given or work shown. (1 point)

SCORE POINT 1
(EXAMPLE A)

22



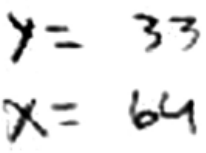
a) Student's answer is correct, with no explanation given or work shown. (1 point)



b) Student's answer is incorrect, with no explanation given or work shown. (0 points)

SCORE POINT 1
(EXAMPLE B)

22

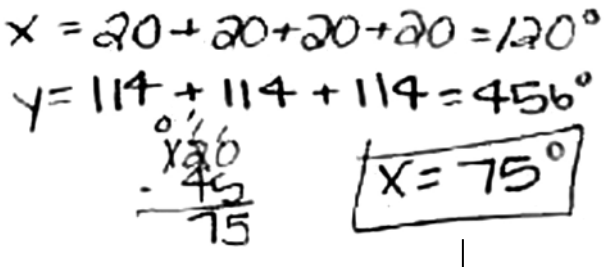


b) Student's answer is correct, with no explanation given or work shown. (1 point)

a) Student's answer is incorrect, with no explanation given or work shown. (0 points)

SCORE POINT 0
(EXAMPLE A)

22



a) Student's answer is incorrect, with work shown that is irrelevant to the concept being measured. (0 points)

b) Student's answer is incorrect, with work shown that is irrelevant to the concept being measured. (0 points)

DSP 10.5 Solves problems involving experimental or theoretical probability.

23 A car dealer has 75 new vehicles. This table shows how the new vehicles are distributed by type and color.

	Cars	Trucks	Vans
Tan	5	2	3
Black	5	7	6
Red	4	2	2
Blue	6	6	8
Other	7	9	3

The sales manager plans to select one vehicle at random for a special promotion.

a. What is the probability that the vehicle selected will be a car?

b. If the vehicle selected is a van, then what is the probability that the van is black?

c. What is the probability that the vehicle selected will be either black or a van? Show your work or explain how you know.

Scoring Guide

Score	Description
4	4 points
3	3 points
2	2 points
1	1 point OR Student shows a minimal understanding of probability.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Part a: 1 point for the correct answer, $\frac{27}{75}$ **(or equivalent)**

Part b: 1 point for the correct answer, $\frac{6}{22}$ **(or equivalent)**

Part c: 2 points for the correct answer, $\frac{34}{75}$ **(or equivalent)**, with appropriate explanation given or work shown

OR

1 point for the correct answer, with incomplete or no work shown

or

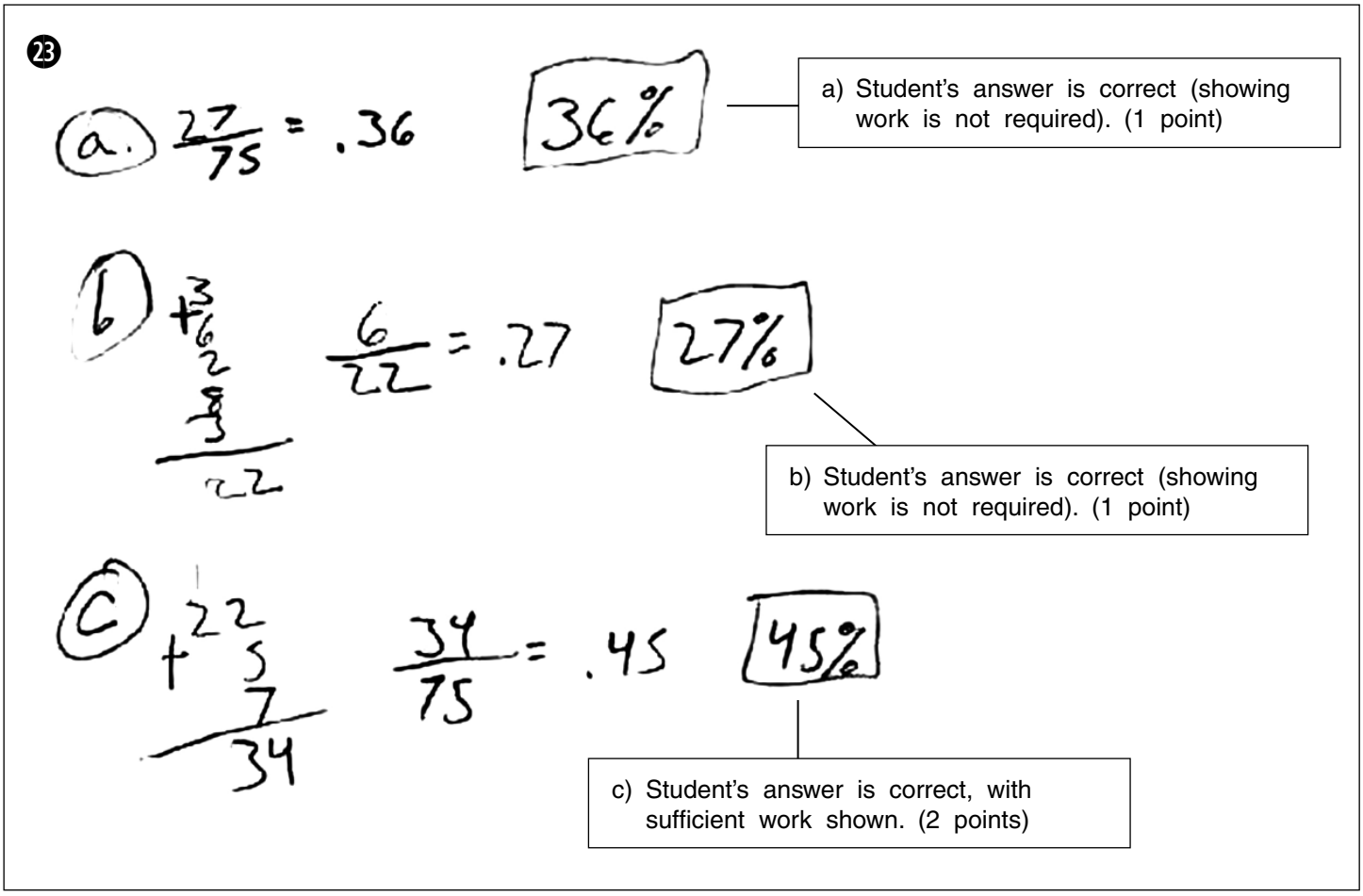
for appropriate strategy shown in solving the problem

Note: Deduct 1 point total for one or more incorrect percentages with the correct probability.

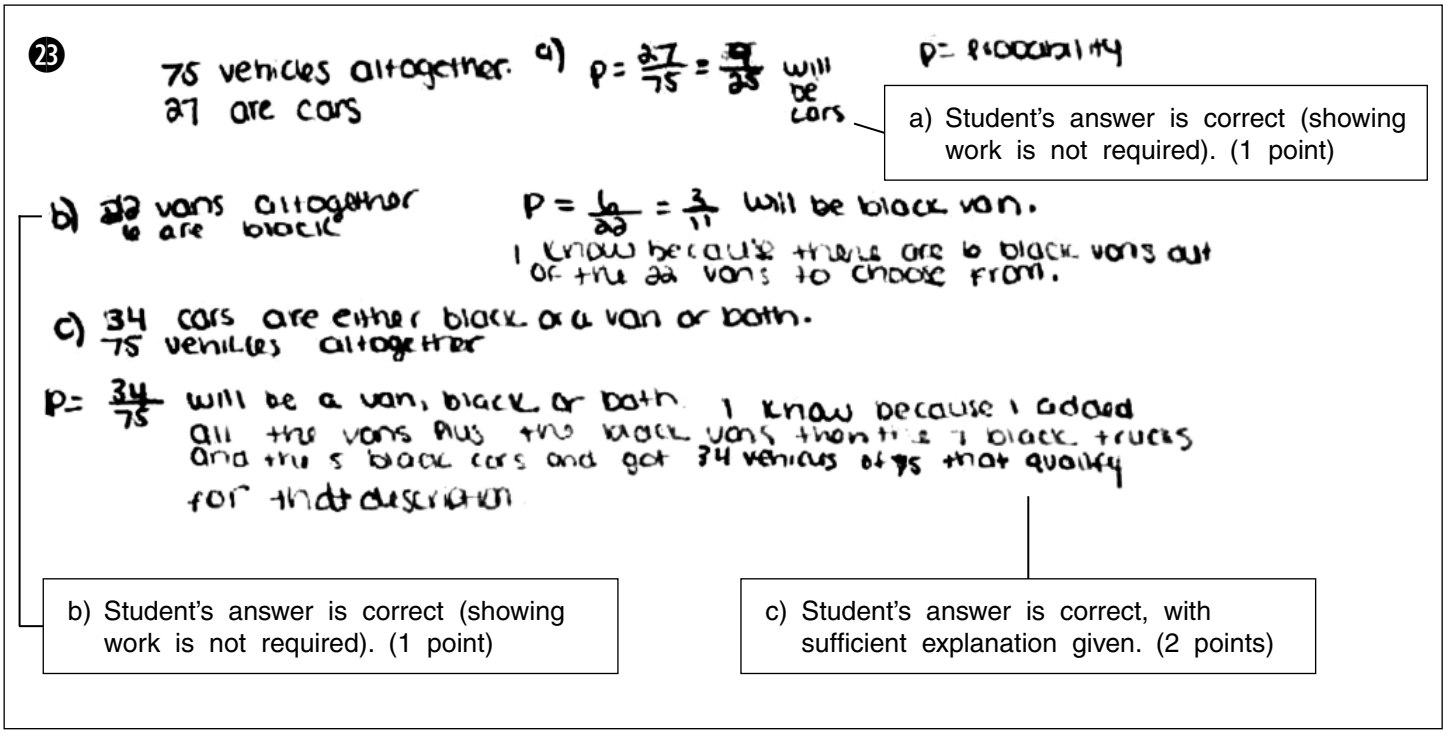
Sample Response:

Part c: There are 22 vans and 18 black vehicles, but 6 are both, so the probability is $\frac{22+18-6}{75} = \frac{34}{75}$.

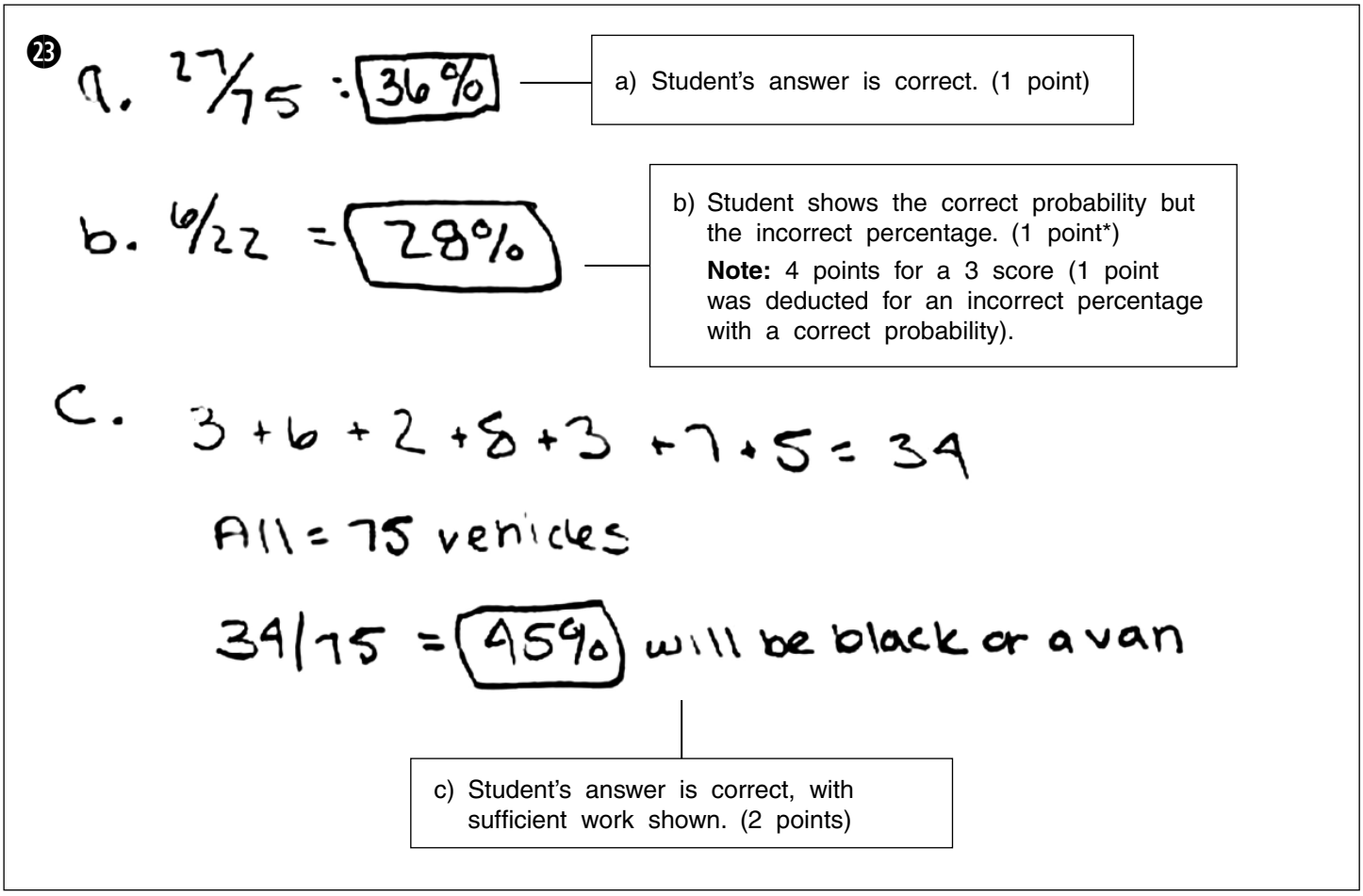
SCORE POINT 4
(EXAMPLE A)



SCORE POINT 4
(EXAMPLE B)



SCORE POINT 3
(EXAMPLE A)



a) Student's answer is correct. (1 point)

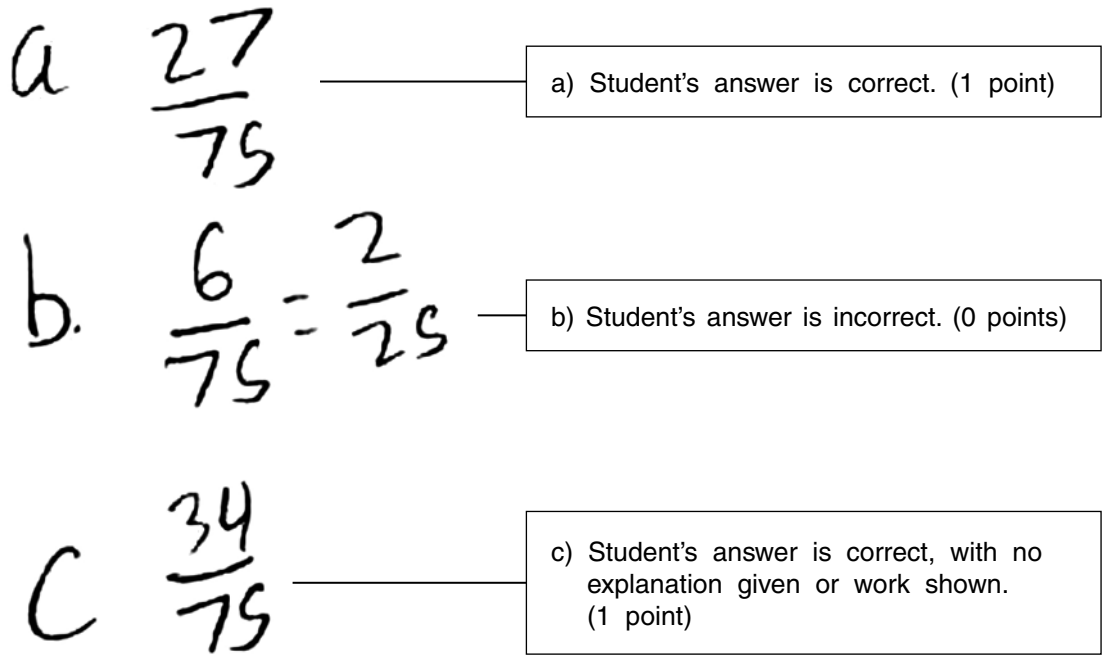
b) Student shows the correct probability but the incorrect percentage. (1 point*)

Note: 4 points for a 3 score (1 point was deducted for an incorrect percentage with a correct probability).

c) Student's answer is correct, with sufficient work shown. (2 points)

SCORE POINT 2
(EXAMPLE A)

23



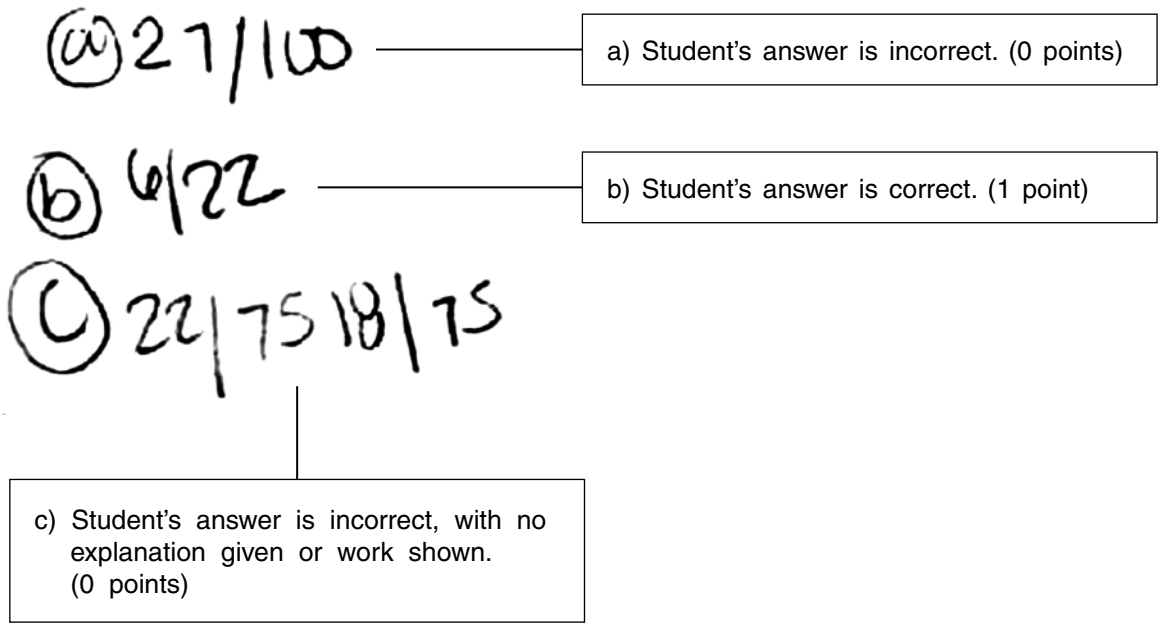
a) Student's answer is correct. (1 point)

b) Student's answer is incorrect. (0 points)

c) Student's answer is correct, with no explanation given or work shown. (1 point)

SCORE POINT 1
(EXAMPLE A)

23



SCORE POINT 0
(EXAMPLE A)